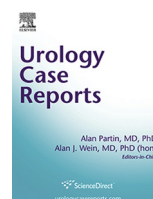


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## Trauma and Reconstruction

## Segmental Renal Infarction due to Blunt Trauma



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## ABSTRACT

Segmental renal infarction is a rare situation which has been reported so far in the form of case reports. It's caused usually by cardiac conditions, such as atrial fibrillation, and systemic diseases (e.g. systemic lupus erythematosus). We are presenting a case of a 31 year old healthy male, who sustained a left segmental renal infarction, following a motorbike accident. We report his presentation, management and outcome. We also review the literature in search of the optimal diagnostic and treatment pathway. To our knowledge, this is the first report of segmental renal infarction due to blunt trauma.

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## Introduction

Renal infarction is an uncommon condition. Spontaneous renal infarction is mostly caused by thromboembolic episodes secondary to cardiac diseases, such as atrial fibrillation, myocardial infarction and rheumatic mitral stenosis, or secondary to systemic conditions, such as lupus erythematosus, polyarteritis nodosa and polycythemia vera.<sup>1</sup> Clinical diagnosis is difficult and frequently delayed as patients often present with non-specific symptoms, such as hematuria and loin pain, nausea and vomiting. Differential diagnosis from renal colic is challenging.<sup>2</sup>

Renal trauma is responsible for 30.8% of acute renal infarction cases.<sup>3</sup> Segmental renal infarction is a rare situation, which has been reported so far only in the form of individual case reports or small case series.<sup>2</sup> All of the reported cases so far correspond to spontaneous segmental infarction due to cardiogenic or systemic conditions, with isolated reports of iatrogenic cause.<sup>4</sup> As far as we are aware this is the first report of segmental renal infarction due to blunt trauma.

## Case presentation

We report a case of a 31-year old male with no previous medical history, admitted to Accident and Emergency (A&E) 4 hours after he sustained a motorbike accident (40 km/h) with minor head injury and right flank injury. The initial assessment revealed right-sided chest and loin bruising and a fracture of upper and shaft of right ulna and tip of olecranon process. The patient was hemodynamically stable. Apart from the pain associated to the trauma no other symptoms were present.

Chest X-ray excluded the presence of pneumothorax or other chest pathology. Triple phase contrast-enhanced computer tomography (CT) showed a demarcated wedge-shaped hypoattenuation of the lower pole renal parenchyma, indicating a right segmental renal infarction (Fig. 1). No extravasations, perinephritic hematoma or free intraabdominal collection was detected. Laboratory results revealed an elevated white blood cell count ( $16.4 \times 10^6$ ), high alanin aminotransaminase (337 IU/L), and slightly increased creatinine levels (121  $\mu$ mol). Urinalysis revealed microscopic hematuria. Electrocardiography (ECG) was normal. A decision was taken to commence prophylactic enoxaparin rather than thrombolysis. The patient was kept overnight for monitoring, and discharged the following day as he remained stable with painkillers and prophylactic antibiotics.

He re-presented the following day with light frank hematuria, combined with right flank pain 7 out of 10 and a blood pressure of 170/90 mm Hg. Blood investigations revealed further rise in WBC

Consent: A verbal consent was obtained from the patient, for this publication.

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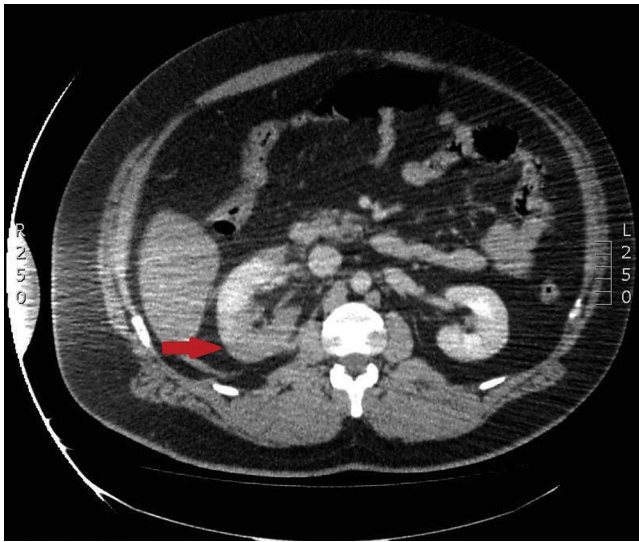


Figure 1. Triple phase CT (day 1).

levels ( $20 \times 10^6$ ), an increased C Reactive Protein of 337 mg/L, and creatinine stable at 122  $\mu\text{mol/L}$ . A CT angiogram was performed, which evidenced a thrombosed lower pole artery (Fig. 2a). Increased perinephric inflammatory stranding was noticed, but again no signs of collection in the surrounding tissues. The delayed urogram showed no evidence of extravasation (Fig. 2b).

To rule out any underlying pathology that might have led to renal ischemia further investigations were performed. There were not any pathological findings on cardiovascular examination or ECG. A full coagulation screen excluded any underlying coagulopathy.

The patient was started on patient controlled analgesia (PCA) and he was put on close observation monitoring with National Early Warning Score (NEWS). During this second inpatient stay his observations were stable apart from a persistent arterial hypertension, with the highest reading being of 180 mm Hg systolic. Biochemical and clinical improvement were seen over the next few days and he was discharged on the 5th day, with oral analgesia. A dimercaptosuccinate (DMSA) renogram was performed 6 weeks from his

discharge and this evidenced a reduced right mid and lower pole uptake and a reduced right renal function of 28% (Fig. 3).

On outpatient follow-up he was found to have normal observations and blood results and was therefore discharged from further follow-up.

## Discussion

This is an interesting case of a healthy young patient who sustained a segmental renal infarction due to blunt trauma. The incidence of segmental renal infarction caused by blunt abdominal trauma is unknown. Renal injury accounts for 8–10% of trauma patients, with blunt injury representing 80–95% of cases.<sup>5</sup> Even though segmental renal infarction can be considered as a potential CT finding in trauma patients, according to our opinion this is one of the very few occasions where the underlying cause is verified to be a thrombosed segmental renal artery. One of the reasons for this is that the standard triple phase CT, which is the main diagnostic tool for most trauma patients, has a low efficacy in identifying the exact cause of segmental infarction. In our case the repeat CT angiogram with delayed urographic phase identified that the lower pole artery was thrombosed. CT angiogram is required in order to delineate between total or segmental renal infarction.<sup>2</sup> On CT, segmental infarction appears as a sharply demarcated, wedge-shaped area of absent contrast enhancement, showing a subcapsular base and apex directed to the hilum.<sup>5</sup>

With regards to the management of segmental renal infarction, thrombolysis has optimal reperfusion outcomes if initiated within 90–180 min from onset.<sup>6</sup> Surgical management can be considered as second-line treatment, whereas surgical debridement might be indicated in cases where more than 50% of the renal parenchyma is infarcted.<sup>5</sup> In our case the patient did not undergo thrombolysis due to his delayed presentation to A&E and his sustained fractures. Conservative management after his second admission achieved a suboptimal control of his renovascular hypertension, but on his outpatient review he had a well-controlled blood pressure. The efficacy of long-term anti-hypertensive treatment is uncertain in these patients, as the infarcted renal tissue is expected to be replaced by scar tissue and the outcome on the blood pressure is variable. Definitely, long-term follow-up is required with regard to blood pressure control. In our case we followed up the patient with a DMSA renogram which evidenced the loss of some of the

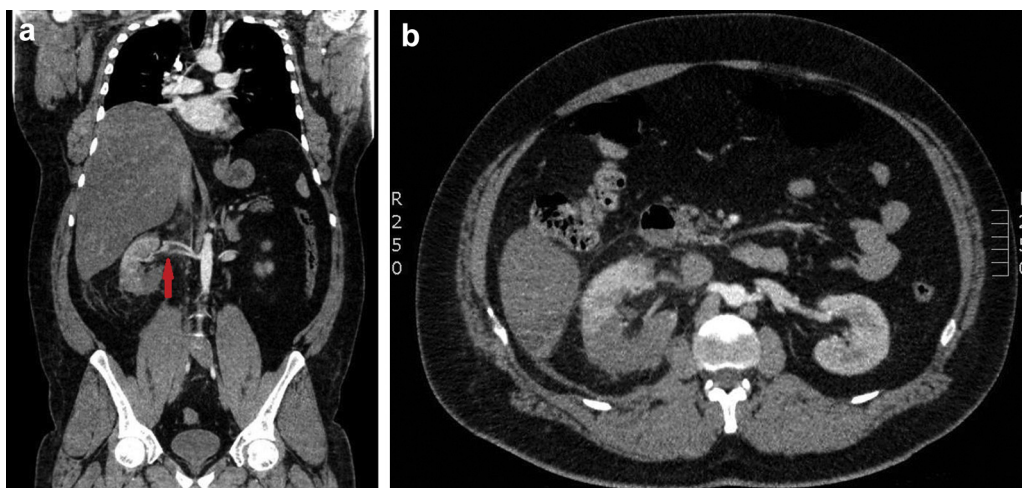


Figure 2. (a and b): CT angiogram/urogram (day3).

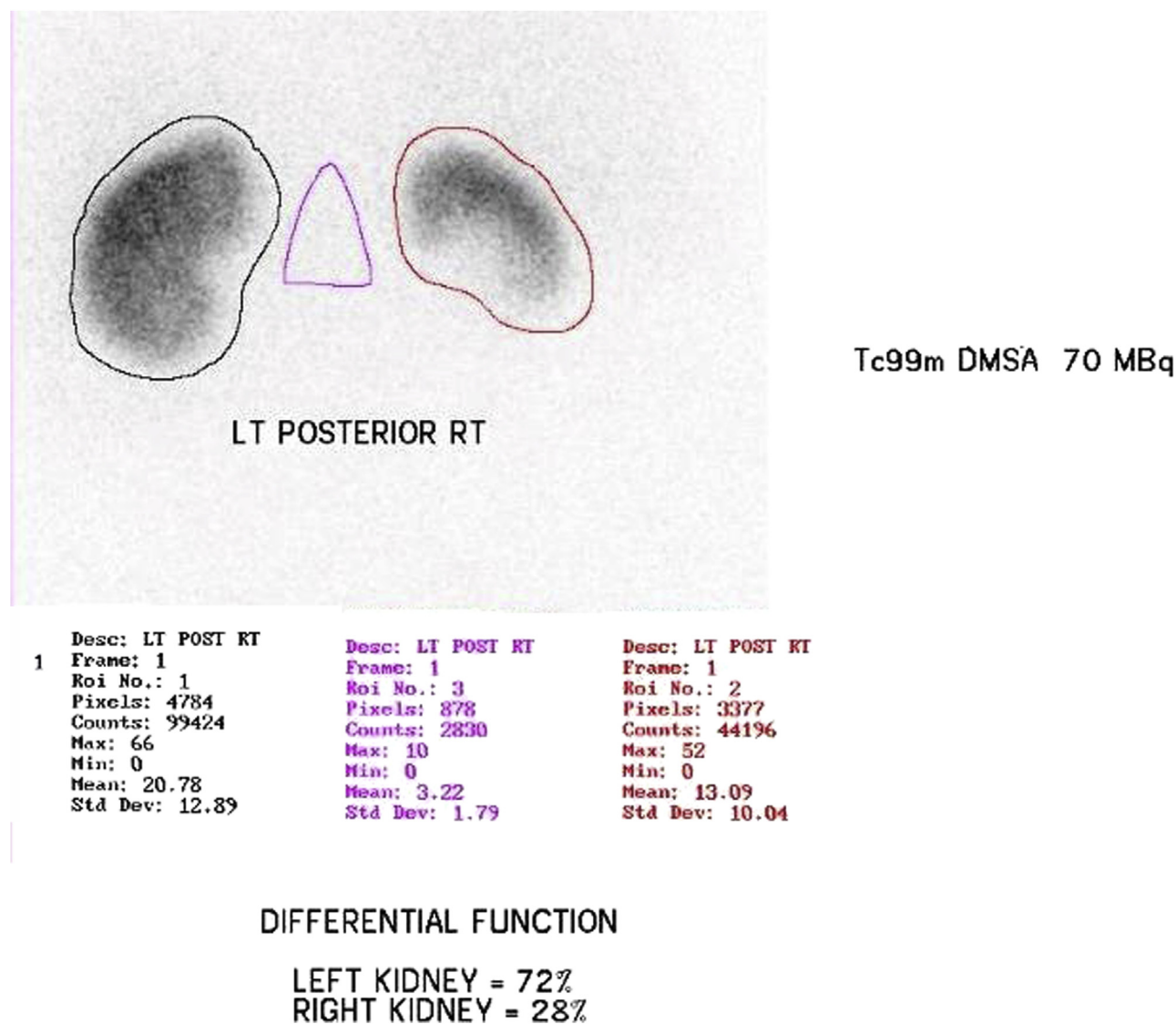


Figure 3. DMSA renogram.

functional renal tissue, as expected. Follow-up imaging in these patients does not seem to be an absolute indication.<sup>6</sup>

### Conclusion

Segmental renal infarction presents with typical radiological findings on CT angiogram. We believe this is the first report of a segmental renal infarction caused by blunt trauma. However, its' real incidence in trauma patients should be higher. When the suspicion is raised, following correlation of clinical history and examination, a CT angiogram should be included in the diagnostic pathway. Early diagnosis can lead to timely beneficial thrombolysis in carefully selected patients, with preservation of the affected renal tissue. However, the prognosis of these patients, irrespective of thrombolysis is excellent.

### Conflict of interest

Authors declare no relevant conflicts of interest of any type.

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